Original Research Article

Performance of different hybrids of sponge gourd (*luffa cylindrica*) in Prayagraj Agro climatic condition.

Abstract

An experiment was conducted to evaluate performance of different hybrids of sponge gourd (luffa cylindrica) in Prayagraj Agro-climatic condition during Rabi season 2021-22. It was conducted at the Vegetable Research Farm, Department of Horticulture Naini Agriculture Institute, Sam Higginbottom University of agriculture, technology and Sciences (SHUATS), Prayagraj (U.P). The experiment was laid in randomized block design with three replications. The result from the present investigation it is concluded that among 14 hybrids of sponge gourd, 2 hybrids namely; AVT-II 2019 SPGHYB-5, AVT-II 2019 SPGHYB-3 exhibited substantially higher fruit yield per plant (4.66) and performed better for other desirable traits in prayagraj agro-climatic condition. In terms of economics the best benefit cost ratio (4.14) AVT-II 2019 SPGHYB-5 was found to be best variety i.e., gives the high return.

Keywords: Performance, hybrids, sponge gourd (*Luffa cylindrica).*

Introduction

In India, sponge gourd and ridge gourd are cultivated both as a single crop on arable ground and as a mixed crop in river bed cultivation. Sponge gourds can be grown in tropical and subtropical climates, but they prefer warm, humid weather. Its growth is not suited to cool weather, low temperatures, or situations with frost. Nowadays, the sponge gourd is grown extensively for medical purposes in Malaysia, Korea, Japan, India, Central America, Thailand, the Philippines, Indonesia, Taiwan, and China. The largest importers of sponge gourd are Brazil and the United States, whereas Japan is the main exporter. The crop is widely farmed throughout India, particularly in Uttar Pradesh, Bihar, West Bengal, Orissa, Assam, and Kerala.

Sponge gourd [*Luffa cylindrica* (L.) *Roem*.], is a herbaceous vine of Cucurbitaceae family. The cross-pollinated crop Luffa is a diploid species with 26 chromosomes (2n = 26). The exact size and production of sponge gourds in our country are unknown, but the estimated area under all gourds is 4.05 lakh hectares. Sponge gourds are produced as mixed cropping in river banks and as a mono crop in garden areas.

In India, sponge gourds are grown in household gardens and on a commercial basis. Both species include luffein, a gelatinous substance. The genus derives its name from the product 'loofah', which is used in bathing sponges, scrubber pads, doormats, pillows, and mattresses and also for cleaning utensils. Luffa requires a long warm season for best production. It also grows best during the rainy season. Low temperatures are difficult for seed germination because of the strong seed coat. When cultivated on sandy loam soil, it produces the finest results. The ability of the soil to retain moisture is important, especially during the summer. For plantations, soil with a pH between 6.5 and 7.0, or neutral to slightly alkaline soil, is best. Its growth requires temperatures between 25 and 28 degrees Celsius. In general, irrigation should be administered based on the kind of soil and the weather. In prolonged dry spells, irrigation should be carried out twice weekly; during the rainy season, irrigation is not necessary. However, mulching can be used to avoid water loss or manage weeds in extremely hot climates. Farmers use living tree, dead branches, a wall or roof for supporting the climbing vines.

This study aimed to evaluate performance of different hybrids In terms of growth, yield and quality of sponge gourd and to estimate the economics of various hybrids.

Material and Methods

The experiment was conducted during the Rabi Season of 2022 at the Research Field Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj using randomized block design with three replications. During the period of experimental trail, the maximum temperature of the location reaches up to 45 ºC – 50 ºC and seldom falls as low as 02 ºC – 05 ºC. The relative humidity ranges between 19 to 90 percent. The average rainfalls in this area are around 1013.4 mm annually.

Table 1. List of sponge gourd Hybrids

Hybrid Symbol	Name of Hybrids	Source
G1	AVT-1 2020 SPGHYB-1	IIVR, Varanasi
G2	AVT-1 2020 SPGHYB-2	IIVR, Varanasi
G3	AVT-1 2020 SPGHYB-3	IIVR, Varanasi
G4	AVT-1 2020 SPGHYB-4	IIVR, Varanasi
G5	AVT-1 2020 SPGHYB-5	IIVR, Varanasi
G6	AVT-1 2020 SPGHYB-6	IIVR, Varanasi
G7	AVT-1 2020 SPGHYB-7	IIVR, Varanasi
G8	AVT-2 2019 SPGHYB-1	IIVR, Varanasi
G9	AVT-2 2019 SPGHYB-2	IIVR, Varanasi
G10	AVT-2 2019 SPGHYB-3	IIVR, Varanasi
G11	AVT-2 2019 SPGHYB-4	IIVR, Varanasi
G12	AVT-2 2019 SPGHYB-5	IIVR, Varanasi
G13	AVT-2 2019 SPGHYB-6	IIVR, Varanasi
G14	ALOK	VNR

The data were subjected to analysis of variance according to Panse and Sukhatme (1967). The genotypic and phenotypic coefficients of variation were computed according to Burton and Devane (1953). The broad sense heritability was computed according to Falconer and Mackay (1996). Genetic advance over mean was worked out according to Johnson et al. (1955).

Result and Discussion

The salient results of the study and conclusion drawn from the experiment are summarized below:

Analysis of variance showed significant differences among the hybrids for the twenty-one characters studied, Analysis of variance showed significant difference among the hybrids for the different characters at 1% significance.

Table 2. Mean Performance of different hybrids of sponge gourd on growth and earliness parameter

Sl. No.	Name of Genotype	Days Taken to Germination	Days to 1st leaf emergence	No of primary branches per plant	No of node/plant	Vine Length(cm) at Final Harvest	Days to emergence of 1st male flower	Das to emergence of 1st female flower	Node No. at 1st male flower	Node No at 1st female flower	Days to first fruit picking
1	**AVT-I/2020/SPGHYB-1**	9.75	13.25	5.17	44.50	430.83	44.17	48.17	4.58	6.42	56.00
2	**AVT-I/2020/SPGHYB-2**	9.92	14.00	5.50	43.67	305.58	43.33	49.17	4.58	8.42	62.42
3	**AVT-I/2020/SPGHYB-3**	11.50	14.33	7.33	49.50	286.42	42.67	47.42	5.25	5.67	59.67
4	**AVT-I/2020/SPGHYB-4**	8.58	13.33	5.75	44.83	293.92	43.83	49.58	4.33	5.33	58.75
5	**AVT-I/2020/SPGHYB-5**	9.83	13.75	4.33	41.75	362.25	43.67	51.00	6.33	7.08	55.83
6	**AVT-I/2020/SPGHYB-6**	9.33	13.75	5.50	42.42	304.00	44.50	48.67	4.08	6.33	55.67
7	**AVT-I/2020/SPGHYB-7**	9.08	15.42	4.67	43.83	268.25	45.33	48.58	5.25	6.42	54.75
8	**AVT-II/2019/SPGHYB-1**	9.42	13.17	5.42	44.67	269.17	43.33	48.50	5.17	8.08	53.42
9	**AVT-II/2019/SPGHYB-2**	10.00	12.92	5.75	45.33	340.83	43.83	48.33	4.92	6.75	54.17
10	**AVT-II/2019/SPGHYB-3**	10.17	13.75	5.92	45.75	438.75	44.00	51.42	6.25	5.92	58.00
11	**AVT-II/2019/SPGHYB-4**	9.75	13.75	7.58	49.67	278.50	45.25	47.17	4.25	5.42	56.92
12	**AVT-II/2019/SPGHYB-5**	8.25	15.33	5.92	43.25	329.92	42.50	48.92	5.33	6.42	62.58
13	**AVT-II/2019/SPGHYB-6**	8.75	14.50	5.50	44.33	385.67	43.50	47.33	4.92	5.75	54.00
14	**ALOK [VNR]**	9.67	12.00	4.08	42.50	298.58	45.08	48.17	4.83	7.17	54.92
F-Test		S	S	S	S	S	S	S	S	S	S

CV	5.38	3.07	8.54	2.61	13.42	0.57	1.00	7.38	7.59	2.7
SE.d	0.42	0.34	0.39	0.95	35.95	0.20	0.39	0.30	0.40	1.25
CD at 5%	0.86	0.71	0.80	1.96	73.90	0.42	0.81	0.62	0.82	2.58

Table 3. Mean Performance of different hybrids of sponge gourd on yield and qualitative parameter

Sl. No.	Name of Genotype	No. of fruits per plant	Fruit weight of 1 fruit (g)	Fruit yield per plant (Kg)	Fruit length (cm)	Fruit diameter (cm)	Fruit yield per plot (kg)	Fruit yield (q/ha)	Ascorbic acid	TSS(Brix)
1	AVT-I/2020/SPGHYB-1	24.33	161.08	3.92	11.68	3.53	15.67	112.05	8.67	10.00
2	AVT-I/2020/SPGHYB-2	27.25	120.33	3.95	10.88	3.87	15.79	112.94	8.33	10.67
3	AVT-I/2020/SPGHYB-3	27.42	119.75	3.86	11.16	3.63	15.43	110.32	9.33	9.33
4	AVT-I/2020/SPGHYB-4	27.50	155.08	4.27	11.76	3.70	17.07	121.99	9.67	10.00
5	AVT-I/2020/SPGHYB-5	28.08	116.50	4.37	9.91	3.89	17.47	124.95	11.00	10.00
6	AVT-I/2020/SPGHYB-6	22.50	138.67	3.46	10.20	3.40	13.80	98.74	8.67	9.67
7	AVT-I/2020/SPGHYB-7	23.08	162.58	3.84	10.83	4.04	15.35	109.67	9.67	9.67
8	AVT-II/2019/SPGHYB-1	27.08	166.83	4.52	10.29	4.10	18.07	129.13	11.67	10.00
9	AVT-II/2019/SPGHYB-2	27.17	165.08	4.49	11.43	3.39	17.92	128.14	8.67	11.33
10	AVT-II/2019/SPGHYB-3	29.00	161.00	4.66	11.21	3.52	18.63	133.15	9.67	9.33
11	AVT-II/2019/SPGHYB-4	26.33	165.42	4.36	11.28	3.64	17.41	124.45	10.33	9.67
12	AVT-II/2019/SPGHYB-5	27.25	166.83	4.66	11.19	4.16	18.64	133.21	9.00	9.00
13	AVT-II/2019/SPGHYB-6	27.42	164.42	4.44	9.85	3.57	17.73	126.82	10.33	9.33
14	ALOK [VNR]	29.00	157.92	4.53	10.76	3.87	18.12	129.44	10.00	10.00
F-Test		S	S	S	S	S	S	S	S	NS
CV		1.07	3.01	6.86	3.94	6.80	6.87	6.86	9.61	9.98
SE.d		0.23	3.72	0.23	0.35	0.20	0.95	6.78	0.75	0.80
CD at 5%		0.48	7.65	0.48	0.72	0.42	1.95	13.95	1.55	1.65

Table 4 Fruit Colour and Fruit Shape of sponge gourd hybrids

Hybrid Symbol	Name of Genotype	Fruit Colour	Fruit Shape
G1	AVT-1 2020/SPGHYB-1	GREENISH	Long Cylindrical
G2	AVT-1 2020/SPGHYB-2	DARK GREEN	Medium Cylindrical
G3	AVT-1 2020/SPGHYB-3	GREENISH	Long Cylindrical
G4	AVT-1 2020/SPGHYB-4	GREENISH	Long Cylindrical
G5	AVT-1 2020/SPGHYB-5	DARK GREEN	Small Cylindrical
G6	AVT-1 2020/SPGHYB-6	GREENISH	Medium Cylindrical
G7	AVT-1 2020/SPGHYB-7	LIGHT GREEN	Medium Cylindrical
G8	AVT-2 2019/SPGHYB-1	GREENISH	Small Cylindrical
G9	AVT-2 2019/SPGHYB-2	DARK GREEN	Long Cylindrical
G10	AVT-2 2019/SPGHYB-3	DARK GREEN	Long Cylindrical
G11	AVT-2 2019/SPGHYB-4	GREENISH	Medium Cylindrical
G12	AVT-2 2019/SPGHYB-5	GREENISH	Long Cylindrical
G13	AVT-2 2019/SPGHYB-6	DARK GREEN	LONG CYLINDRICAL
G14	ALOK[VNR]	GREENISH	SMALL CYLINDRICAL

The results of present study also revealed that out of 14 hybrids of sponge gourd, 2 genotypes namely; **AVT-II 2019 SPGHYB-5** (4.66 kg/plant)**, AVT-II 2019 SPGHYB-3** (4.66 kg/plant) possessed maximum fruit yield per plant**.** Therefore, these genotypes may be promoted for cultivation as wellas in future breeding programme to develop superior varieties for eastern plain zones of Uttar Pradesh.

A wide range of variability in sponge gourd (*luffa cylindrica*) was observed fordifferent characters viz. days taken to germination (8.25-11.50), Days to 1st leaf emergence (12.00 – 15.42 days), No of primary branches per plant (4.08-7.58), No of node/plant (41.75 – 49.67 nodes), Vine length(m) at final harvest stage (268.25-438.75 cm), Days to emergence of 1st male flower (42.50 – 45.33 days), Days to emergence of 1st female flower (47.17 – 51.42 days), Node No at which 1st male flower in appear (4.08-6.33 nodes), Node No at which 1st female flower in appear (5.33 - 8.42 nodes) Days to first fruit picking (53.42-62.58 days),

Number of Fruits per Plant (22.50 – 29.00 fruits), Fruit weight of 1 fruit (116.50-166.83 g), Fruit length (cm) (9.85-11.76), Fruit diameter (cm) (3.39-4.16), Fruit yield per plot (13.80-18.64 kg), Fruit yield (98.74-133.21 q/ha), TSS (9.00-11.33 Brix), Ascorbic acid (%) (8.33-11.67).

Significant positive association of these above attributes indicated that these attributes were mainly influencing the fruit yield in bitter gourd. Thus, selection practiced for the improvement inone character will automatically result in the improvement of the other character even if direct selection for improvement has not been made for the yield character. The significant correlation at both the levels between above attributing characters can be used for simultaneous improvementin both the characters with selection for one character only while selection for correlated charactermay not be done. However, significant correlation only at genotypic level reflects the masking effects of the environment.

Conclusion

From the present investigation it is concluded that among 14 hybrids of sponge gourd, 2 hybrids namely; AVT-II 2019 SPGHYB-5, AVT-II 2019 SPGHYB-3 exhibited substantially higher fruit yield per plant (4.66) and performed better for other desirable traits in prayagraj agro-climatic condition. In terms of economics the best benefit cost ratio (4.14) AVT-II 2019 SPGHYB-5 was found to be best variety i.e., gives the high return. The analysis of variance for all characters of sponge gourd hybrids revealed presence of good extant of significant differences among the hybrids for all traits. Henceforth, the data for all characters that showed sufficient amount of significant differences were subjected to further statistical analysis.

REFERENCES

1. Choudhary BR, Kumar S, Sharma SK. Evaluation and correlation for growth, yield and quality traits of ridge gourd (*Luffa acutangula*) under arid conditions. Indian Journal of Agricultural Sciences. 2014; 84(4):498-502.
2. Choudhry D, Sharma KC. Studied on variability, heritability, genetic advances and correlation in ridge gourd (*Luffa acutangula* Roxb.). Indian Horticulture Journal. 2002;15(3):53-58.
3. Jalam Singh Rathore, J.P. Collis, Gajendra Singh, Kuldeep Singh Rajawat and Bhanwar Lal Jat. (2017). Studies on Genetic Variability in Ridge Gourd [*Luffa acutangula* L. (Roxb.)] Genotypes in Allahabad Agro-Climate Condition. *International Journal of Current Microbiology and Applied Sciences* 6(2): 317-338.

4. Gadha Sreekumar and Devi Singh. (2020). Study on Growth and Yield of Sponge Gourd by using Plant Growth Promoting Rhizobacteria in Prayagraj Agro-climatic Condition. *International Journal of Current Microbiology and Applied Sciences* 9(08): 3585-3591.
5. Mohiddin, Shaik Gouse, Anita Kerketta, Vijay Bahadur, Samir E. Topno, T. Sharon Priyanka and Shaik Abdul Khuddus Mohiddin (2022). Evaluation of Different Genotypes of Sponge Gourd (*Luffa cylindrica* M. Roem.) for Growth Yield and Fruit Quality in Prayagraj Agro-climatic Conditions. *International Journal of Environment and Climate Change 12(11): 66-72.*
6. Prakash, K, Radhamani, J, Pandey, A, and Yadav, S. (2013) A preliminary investigation of cultivated and wild species of Luffa for oil and protein contents. *Plant Genet Resour*. 12:103–11.